Introduction
When you think of backyard farming, most likely you think of tomatoes, onions or maybe even carrots but with the same ease, you could plant peas and enjoy a good harvest without too much farming expertise. Pea is an important nutritious leguminous vegetable that is widely cultivated throughout the world. It is a cool-season, frost-hardy, crop extensively grown in temperate zones but also restricted to cooler altitudes in the tropics and winter seasons in the subtropics. It is a rich source of proteins, amino acids, sugars, carbohydrate, vitamins A and C, calcium and phosphorous, and also has a small quantity of iron.

Climatic requirements
Peas is grown under various weather conditions. It requires a cold and dry climate. The long cold spell helps in increasing yield. Pea seed can germinate even at a minimum temperature of 5 °C but the process is slow. The optimum temperature for germination is about 22 °C but at higher temperatures, germination is rapid. The optimum temperature for good growth is between 1 °C to 18 °C.

Soil requirements
Pea can be grown on all types of soils but prefers well-drained sandy loam soils. Pea prefers soils that do not dry out. The soil should be rich in organic matter as it enhances better growth by supplying nutrients. Pea does not thrive
in acidic, alkaline, or saline soils. It grows best at a pH of 6.5. If the pH is less than 6.0, then it should be amended using lime to improve the soil condition. **For free soil pH testing, please visit Windmill Laboratories at 21 Coventry Road, Workington, Harare or simply call +2634753784/93.**

Cultivation practices  
**Land preparation**  
The field should be prepared well by ploughing but the soils should not be pulverised or made too fine. However, it must be free from weeds and stubble. Well-decomposed farmyard manure at 25 to 30 t/ha can be applied during ploughing. After ploughing, the field should be levelled to allow proper distribution of irrigation water.

**Seed treatment/ Inoculation**  
Peas are propagated by seed. About 70 to 75 kg/ha seed is required to plant out one hectare of crop. Pea seeds may be treated with Rhizobium culture. The bacterium used for inoculations is Rhizobium *leguminosarum*. This will help fix atmospheric nitrogen (up to 50 kg/ha) and reduce nitrogen fertiliser application. The seed should not be exposed to direct sunlight after treatment with Rhizobium inoculum.

- Rhizobium inoculant can be obtained from the Zimbabwean Department of Research and Specialist Services. It is packed in sachets with clear instructions on how to apply it to seed.

Application of inoculant to the seed is an extremely important procedure. Many failures with nitrogen fixation have been associated with improper application technique. Thorough coverage of seed is critical because seeds not exposed to bacteria will result in plants that are unable to fix nitrogen. Inoculants are living organisms, so proper storage and handlings are important. Producers should refer to the manufacturer’s package labels to review proper inoculum rate and handling procedure.  
After crop establishment, growers should check their fields to determine if inoculation was successful. Normally nodules will form on the roots two to four weeks after emergence. To check for nodulation, carefully dig up a few plants and gently clear the soil from the root mass. Nodules will be present both on the primary root and on the lateral roots. Effective nodules will have a pink to red coloration on their interior. If nodulation does not occur and soil nitrogen levels are low, an application of nitrogen fertiliser over the top may be required to optimise seed yields. Nitrogen fixation will take place from about four weeks after emergence through seed formation.

If Rhizobium inoculum is not available, 200 kg of soil (2-10 cm surface soil) can be collected from a particular area, where Rhizobium had been applied
before, or a leguminous crop had been cultivated luxuriantly, and should be broadcasted over the field.

**Planting**
Pea is normally sown directly into the fields where it is grown to maturity, but it can also be sown early in pots in a greenhouse, for planting out. Sow early in March, second sowing in April, third sowing in May, and late sowing using early varieties in June or even to early July. About 70 to 75 kg/ha seed is required to plant out one hectare of crop.

Cultivate the soil well and leave it soft and open. Make a shallow drill about the width of a spade-head and 5 cm deep. Scatter pea seeds along the drill or space these evenly about 20 or 30 pea seeds per meter of row in single or double lines. Cover with soil using a rake to draw it over them. Do not sow in wet or poorly cultivated soil but wait a week or two until the soil dries. Pea tends to rot in cold, wet soils. Timely sowing is essential for optimum yields. Late sown crops are often affected by low moisture availability and heavy aphid infestation at medium altitudes and by frost at high altitudes. Below are planting and harvesting dates:

<table>
<thead>
<tr>
<th>Type</th>
<th>Sow</th>
<th>Harvest</th>
<th>Sowing to Harvest (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First early</td>
<td>March to June</td>
<td>June to September</td>
<td>12</td>
</tr>
<tr>
<td>Second early</td>
<td>March to June</td>
<td>June to October</td>
<td>14</td>
</tr>
<tr>
<td>Main crop</td>
<td>March to June</td>
<td>July to October</td>
<td>15</td>
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</tbody>
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**Spacing**
Pea is sown rather densely, with plant densities up to 80 plants per square meter. The seed should be sown 4 to 7 cm deep. Approximately 60 to 200 kg/ha of seed is required, with the highest rate of garden pea. Another important step to consider is to plant pea 3 to 5 cm deep apart in single or double rows. Allow 46 to 60 cm between single or paired rows. Allows 20 to 25 cm between double rows. The peas can be sown directly into the garden as soon as the soil can be worked about five weeks before the last expected frost. Place the seeds about 3 cm deep, about 10 cm apart into rows that are about 1 m apart. For correct row spacing, a string can be used as guide (pulled tense from one end of the row to the other end). Building a small fence with chicken wire, or using climbing guides is also an important step for vining varieties. This is done by guiding the young plants towards the support structure as soon as they start developing long enough shoots to climb.
This keeps the vines free of dirt and too much moisture, which can cause the pea plants to rot. Water the peas after planting and keep them moist. Excessively wet conditions are not healthy for pea production. When the plants start to grow, some extra water is essential because the plant needs more moisture at this stage. The pea will be ready for harvest in about three weeks after the first few flowers.

**Fertilisation**
For a good crop, apply about 500 kg per hectare of basal compound C (5:15:12) fertiliser. The crop should be top dressed at first pod set with potassium nitrate (13:0:46). Apart from application of fertilisers and manures, it is essential to treat the seed with Rhizobium inoculum for better nodulation, plant vigour and high grain yields.

**Irrigation**
The water requirement of peas is comparatively low. Pre-sowing irrigation is essential for proper germination if the soil is dry. The frequency of irrigation depends on the type of soil and winter showers. Generally two to three irrigation intervals are required. Soil moisture deficit reduces growth and hampers
nodulation. Frequent irrigation should always be avoided (as excess moisture results in yellowing crop, reducing the yield) but the crop must be provided with irrigation at the pod filling stage and when frost is expected during the growth period. Furrow irrigation is used generally for irrigating pea but the sprinkler irrigation method is better. Moisture stress during flowering and pod filling severely limits yield and quality of pods.

**Weed control**

Weeds should be rigorously controlled. The critical period of weed competition is 3 to 8 weeks after emergence. The pea crop severely suffers because of weed growth at the early stages. This might be the result of widespread spacing given for hand picking of green pods or for slow growth of pea during the early stage. Later the crop smothers the weed growth by covering the ground.

Generally two to three weedings are necessary to keep the field free from weeds. Manual weeding is better than mechanical weeding to avoid damage to the root systems. Weeding at a later stage is avoided as it may also damage the crop by trampling and mechanical breakage of tender and succulent stems and branches. Weeds can be controlled by hand-weeding where labour is cheap, whereas chemical weed control is more practical in large-scale production.

**Pest control**

**Leaf weevil (Sitona lineatus)**

The pea leaf weevil (Sitona lineatus) is an insect that damages peas and other legumes. It is native to Europe but has spread to other areas. The weevil is about 3.5 mm to 5 mm long and distinguishable by three light coloured stripes running length-wise down the thorax. The weevil larvae feed on the root nodules of pea plants, which are essential to the plant supply of nitrogen, and therefore diminish leaf and stem growth. Adult weevils feed on the leaves and create a notched “c shaped” appearance on the outside of the leaves.

Pea weevils thrive and damage plants under cool, wet conditions and become less of a problem as the weather warms up. Check emerging pea plantings by examining plants and rolling over dirt clods where adults may be hiding. Cone traps with aggregation pheromone can also be used. Economic damage can occur at densities as low as 33% adult weevils per seedling plant. Consider 25% growth point injury on seedling plants an action threshold.

Crop rotation and planting peas away from other legumes is useful. Irrigation and proper fertilisation may help crops outgrow defoliation.

**Pod borers (Etiella zincenella and Helicoverpa armigera)**

The moths are medium sized with a wingspan of 2.5 cm and wing colour is grey with dark marginal lines interspersed with ochrous scales on the forest wings.
The early larvae are greenish and the full grown ones are rosy with a purplish tinge. The caterpillars enter the pods and feed on the seeds. The caterpillars also consume the flowers. Consumed flowers and holes on the pods are the characteristics of the presence of this pest. Deep ploughing is likely to kill the diapausing pupae. The pest population can be kept under control by spraying a botanic pesticide prepared from neem seed.

**Leaf miner (Phytomyza atricornis)**
Leaf miner is a small insect with a large globular head and black thorax having yellow markings on the sides. It is a major polyphagus pest of pea. Adult insects puncture the leaf either to lay eggs or to feed on the plant sap while the larvae feed on the leaf tissue as they mine. A series of triangular blotches in which eggs are deposited or irregular mined areas the visible symptoms of attack by this pest.

Cultural control can be achieved by removing and destroying the infested leaves which are identified by the mined areas and blotches.

The maggots of this pest are parasitized by the hymenopteran *Solenotus sp, and Neochrysocharis sp and Opius sp* which allows for biological control.

**Aphids**
Aphids are found on new stems and the underside of the leaf. They are usually green. They suck fluids from the plant, leaving a honey dew substance behind. Leaves turn pale yellow.

Aphid control can be achieved using insecticide sprays with products such as Dimethoate 40 EC, or a strong stream of water. Ladybird beetles are natural predators. Also a layer of Alumnus foil under the plants reflects light to the underside of leaves and may deter aphids.
Cutworms
Cutworms chew off plants just above the ground level. Cutworms are caterpillars that are up to 3 cm long and moulted or striped green, brown or grey. When they are disturbed they roll up or coil. They usually position themselves at the moisture line in the soil, moving up and down according to the water content. If the surface soil is dry, they will be found a couple of centimetres below the soil surface. Cutworms can be controlled by spraying with Lamda-cyhalothrin 5 EC soon after seedling emergence.

Slugs and snails
Slugs and snails damage young plants resulting in poor stands. Slugs and snails are very susceptible to desiccation (drying) and require a moist, shady place to live. Cultural practices which promote a sunny and dry environment will discourage them. Avoid too frequent watering, and allow the soil surface to dry out between irrigations. Keep the garden free from debris, boards, bricks, and stones where they hide. Hand picking these pests is very effective. Create traps for hand picking or laying boards in the garden. Slugs and snails will congregate under them. Lift the boards each morning and collect the slugs and snails.

Dispose of them completely as they will crawl back if tossed out of the garden, and eggs inside can still hatch to produce more of these pests. Slug and snail baits containing metaldehyde can be placed near food plants as they do not contact edible portions of the crop. It is most effective when moistened, but not waterlogged. Snail bait attracts slugs and snails from several metres away so bait stations are effective. Stations help protect birds, pets and other non-target animals which are also attracted to the bait.

Place small piles of bait under a slightly propped up board or use a container such as a cottage cheese or yogurt carton. Bury the carton to the mouth of the container. Place a small quantity of commercial bait inside and moisten with apple juice, orange juice, or water. Cut a hole in the lid to allow access and place lid on container. Containers may also hold beer or yeast water to attract slugs and snails in, where they drown. Place bait stations wherever slugs and snails are active or around the perimeter of the garden.

**Disease Control**

**Wilt** (*Fusarium oxysporum f. sp.pisi*)

Plants that are infected become stunted, pale-yellow green with leaves curled downwards. The stems become thickened and brittle at ground level. As a result, the plants wilt and die off prematurely. The disease may cause more or less circular bare spots in the field, enlarging each year if peas are planted continuously. The disease is favoured by high soil moisture.

Control measures:

- Select wilt-resistant varieties.
- Avoid early sowing to escape high humidity and high temperature conditions which favour the disease.
- Crop rotations for at least two to three years with suitable non-leguminous crops.

**Powdery mildew** (*Erysiphe psis*)

The disease occurs worldwide and is much more serious than other diseases because it occurs more frequently and covers a large host surface area. It is
worst in dry weather. Early varieties are less damaged. Varieties maturing in January usually escape the maximum intensity of the disease.

This disease is characterised by small lesions that appear on the upper surface of the lowest and older leaves. These lesions are scattered on the leaves and as they mature and develop they look like white, powdery areas. Severely infected areas may even look blue–white.

The powdery mildew first appears on the leaves and then on other green parts of the plant. Its attack is characterised by the formation of white, floury patches on both sides of the leaf as well as on tendrils, pods and stems. These patches originate as minute discoloured specks from which a powdery mass radiates on all sides. When the disease has advanced, large areas on the aerial parts of the host may be covered with these white, floury patches. The superficial mass consists of mycelium and spores of the fungus causing the disease.

Control measures:
- **Fungicides**: Wettable sulphur, or Orius 250 EW. Spray at 7-14 day intervals.
- Burn infected pea stubble soon after harvest where practicable.
- Avoid late sowing of the crop.
- Avoid sowing field pea crops adjacent to last season’s stubble.
- Control volunteer field peas which can harbour the disease.
- Leave four years between field pea crops.
- Use treated seed.

- Also, planting early using sprinkler irrigation will minimise the chances of having a crop infected with powdery mildew.
- Several fungi such as *Ampelomyces*, *Cladosporium*, *Tilleiopsis*, *Verticillium* and insects (*Thrips tabaci*) have been reported to parasitise the powdery mildew on the host surface.
**Downy Mildew (Peronospora pisi Syd)**
This disease is characterised by stunted and distorted plants with fungus growing on all the plant surfaces. These plants may turn yellow while producing more fungi for secondary infections. The plant will develop lesions that are greenish, yellow to brown in colour on the upper leaf surfaces and mouse grey, fluffy areas on the undersides of the leaves.

Control measures:
- Fungicide: Dithane M 45. High volume spray at 7-10 day intervals.
- Use resistant cultivars.
- Crop rotation for at least 2 to 3 years helps in reducing the primary inoculum.
- Diseased plants should be removed and burnt soon after detection in the field.

**Rust (Uromyces sp)**
Two species of *Uromyces* occur on cultivated pea, *Uromyces pisi* and *U. fabae*.
- Destroy all diseased plant debris after harvest.
- Follow a suitable crop rotation with non-leguminous crops.

**Fusarium wilt**
Causes yellowing of lower leaves, stunted growth, wilting, and eventually death.
Control measures:
- Pull up and destroy infected plants.
- Crop rotations.
- Use disease-resistant varieties.

**Aphanomyces root rot**
The disease is characterised by firm, straw coloured lesions that are found on the roots. The lesions spread through the cortex and eventually develop a discoloured root system. The disease can be visible one to two weeks after the infections occur. The best form of control is to check fields before planting and avoid infested fields. There are no resistant cultivars.

**Leaf roll virus**
This disease is characterised by plant distortion, when the plant is still young. As the plant grows and matures, it may take on symptoms of stunted plant growth, yellow spots, leaf and pod distortion, and reduced seed size and quality. The best form of control is to use resistant cultivars.

**Pea seed-borne mosaic**
Affected area-entire plant
This disease is characterised by stunted and malformed plants that may also never reach maturity. The disease can affect the entire plant. The best form of control is use resistant cultivars.

**Pea stunt**
The disease kills off young plants early before they get a chance to bloom. As the plant becomes older, the infections will cause stunted growth and terminal rotting. The best form of control is to use resistant cultivars.

**Seedling rot *Rhizoctania solani***
This disease affects the seed and is characterised by lesions that appear to be water-soaked as the seedling emerges. These lesions will develop a reddish-brown to brown colour and often the growth point may be affected, causing it to die off. Mature plants that become infected will also develop the reddish brown, sunken lesions that may girdle the plant and cause severe stunting. The best form of control is to apply fungicidal seed treatment chemicals (e.g. Thiram 80 WP. Please visit the Windmill website and see the 1 hectare sheet ([www.windmill.co.zw](http://www.windmill.co.zw)).

**Trellising**
Trellises permit plant foliage to dry out, reducing the threat of mildew and other fungal diseases. Single trellis rows are usually spaced 2 m apart, because this is the smallest spacing that will still accommodate a tractor for spraying and cultivation.

The germinating seeds and small seedlings are easily damaged by direct contact with fertiliser or improper cultivation. Cultivate and hoe shallowly during the early stages of growth. Most Dwarf and intermediate varieties are self-supporting. The taller varieties are most productive and more easily picked when trained to poles or to a fence for support, but they are no longer popular. Peas can be mulched to cool the soil, reduce moisture loss and keep down soil rots. Some of the snap and sugar peas are vining types with heights of 2 m or more that require fencing or other supports.

Garden pea is seldom supported. The stems are not twining, but grasp the support with their tendrils. They do not need vertical poles, but the poles can be crossed, or the plants are supported by wire mesh, horizontal wires, vertical lattices or nets, depending on their potential height of the cultivar grown.

**Integrated pest management**
To control insect pests and diseases, integrated pest management (IPM) is recommended.
- Use disease free seed or seed treatment of own seed, keeping fields weed-free.
Appropriate fertilization and irrigation.
Regular monitoring of the crop, and judicious use of biocides.

Harvesting

The harvesting period is 58-74 days depending on variety and growing conditions (soil temperatures, and moisture). Pick garden peas when pods are round (swollen) and full. Pick a few pods every day or two near harvest time to determine if the peas are at the proper stage for eating. Peas have the best quality when they are fully expanded but immature, before they become hard and starchy. The last harvest (usually the third) is made about one week after the first harvest. Pulling the entire plant for the last harvest makes picking easier.

The smooth seeded varieties tend to have more starch than the wrinkle-seeded varieties. The wrinkle-seeded varieties are generally sweeter and usually preferred for home use. The smooth seeded types are used more often to produce ripe seeds that are used like dry beans and to make split pea soup. Snap
peas have been developed from garden peas to have low fibre pods that can be snapped and eaten along with immature peas inside. Snow peas are meant to be harvested as flat, tender pods before the seed inside develop at all.

**Harvesting methods**
Peas should be picked immediately before cooking because their quality, especially sweetness, deteriorates rapidly. The pods on the lower part of the plant mature earliest. The pods are plucked manually from the plants and harvesting may be done at weekly intervals. Peas can be picked as soon as they are big enough. Picking the first pods when the peas are relatively small helps maintain quality. Early picking also helps to extend flowering and cropping by preventing seed setting. Once a few pods set, the plant puts all its energy into swelling these. All the pods should have reached readiness when picking starts.

**Harvesting recommendations**
Shell type and snap type: pick when pods are full, but not swollen. Large peas are tough and less sweet. Edible pod: pick before there is no seed inside the pod. Harvesting the peas every 3 to 5 days will prevent over maturity and stimulate the plants to continue to produce new pods. Harvested peas should be rapidly cooled to 0 °C to 1 °C. Optimum storage conditions are between 0 °C to 2 °C, and 90% to 98% relative humidity.